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Gravitation and General Relativity

High Velocity Collision of Two Black Holes: Initial Data. LARRY SMARR and B.S. DEWITT, Univ. of Texas at Austin--As a first step toward finding the spacetime development of two colliding black holes, one needs to pose realistic initial data. We report progress toward numerical calculation of maximal (but non-time symmetric) initial value spacelike hypersurfaces which represent two black holes colliding head-on with arbitrary closing velocity. The solution is obtained by "adding" two 3-metrics and then, following a suggestion by J.W. York,[1] conformally mapping this sum onto a 3-geometry which satisfies the constraint equations. Each of the 3-metrics to be added is a maximal slice of Schwarzschild which becomes asymptotic to boosted $\bar{t}$=constant slices.

[1]J.W. York, Jr. "Conformally Invariant Orthogonal Decomposition of Symmetric Tensors on Riemannian Manifolds and the Initial Value Problem of General Relativity," Princeton Univ. Preprint (1972).

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